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FIG. 1A

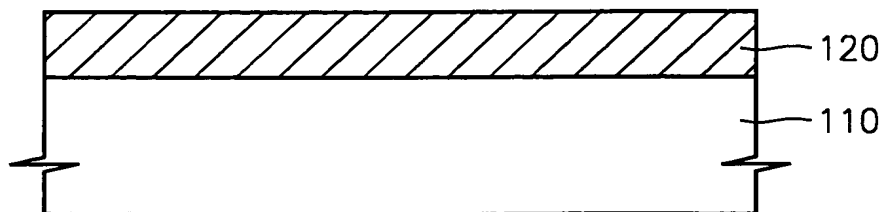


FIG. 1B

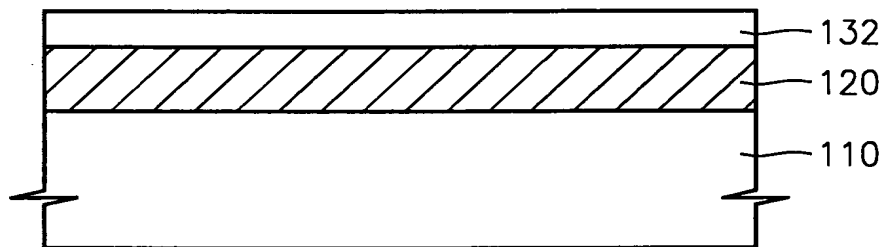
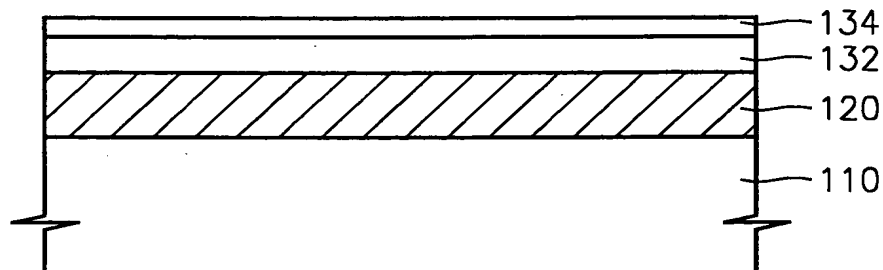


FIG. 1C



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FIG. 1D

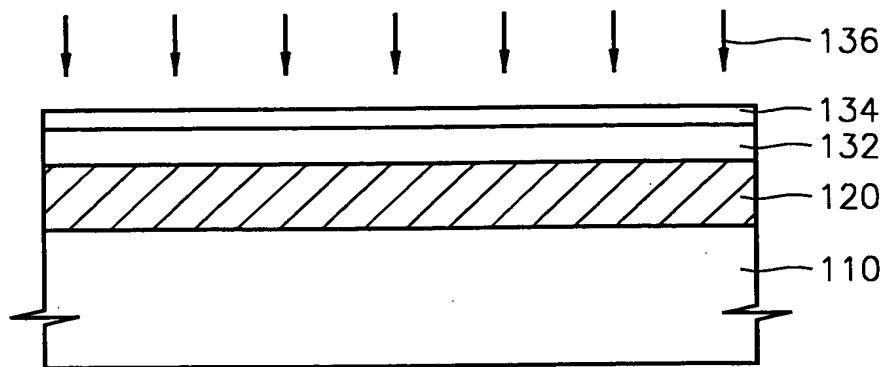
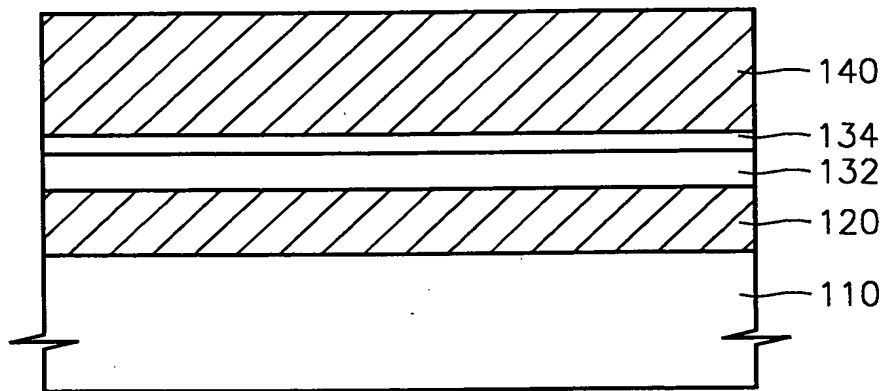
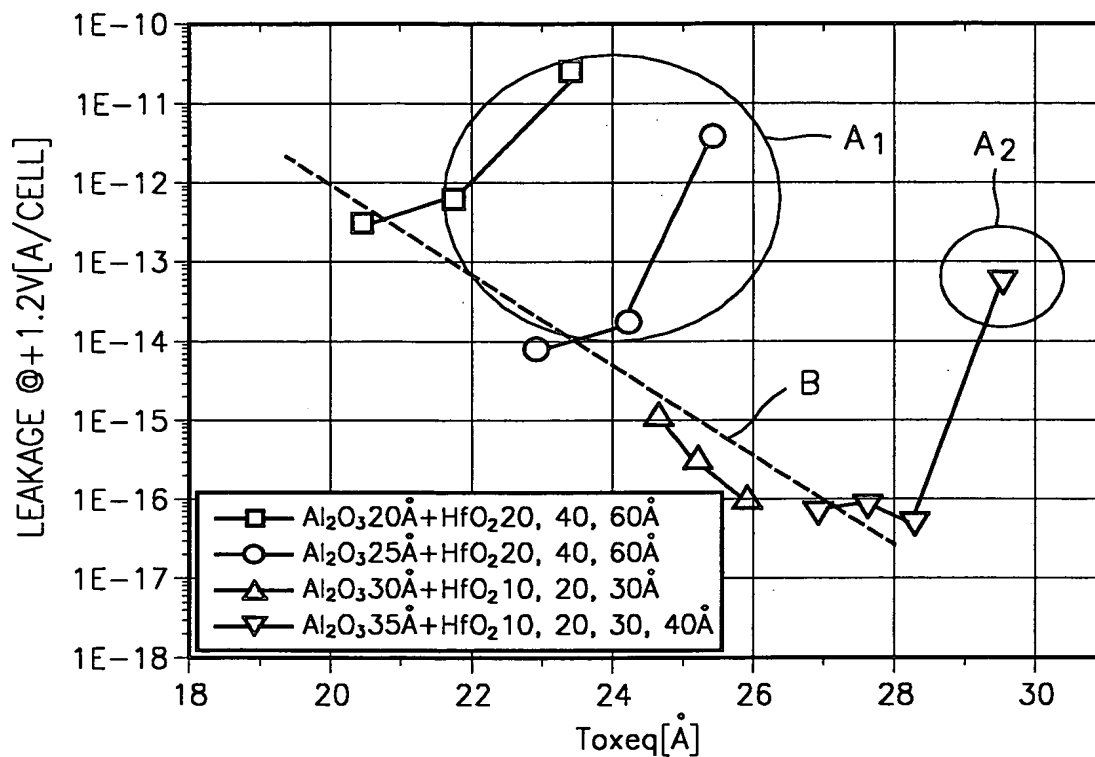


FIG. 1E



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FIG. 2



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FIG. 3

$[\text{Toxeq}(\text{\AA})]$

	10	20	30	40	50	60	HfO_2 THICKNESS(\AA)
10	15.2	15.9	16.5	17.2	17.8	18.5	
15	17.5	18.2	18.8	19.5	20.1	20.8	
20	19.8	20.5	21.1	21.8	22.4	23.1	
25	22.1	22.8	23.4	24.1	24.7	25.4	
27.5	23.3	23.9	24.6	25.2	25.9	26.5	
30	24.4	25.1	25.7	26.4	27.0	27.7	
32.5	25.6	26.2	26.9	27.5	28.2	28.8	
35	26.7	27.4	28.0	28.5	29.3	30.0	
40	29.0	29.7	30.3	31.0	31.6	32.3	
Al_2O_3 THICKNESS(\AA)		NORMAL LEAKAGE CURRENT				LEAKAGE CURRENT DETERIORATION	$\text{SiON} = 10\text{\AA}$

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FIG. 4

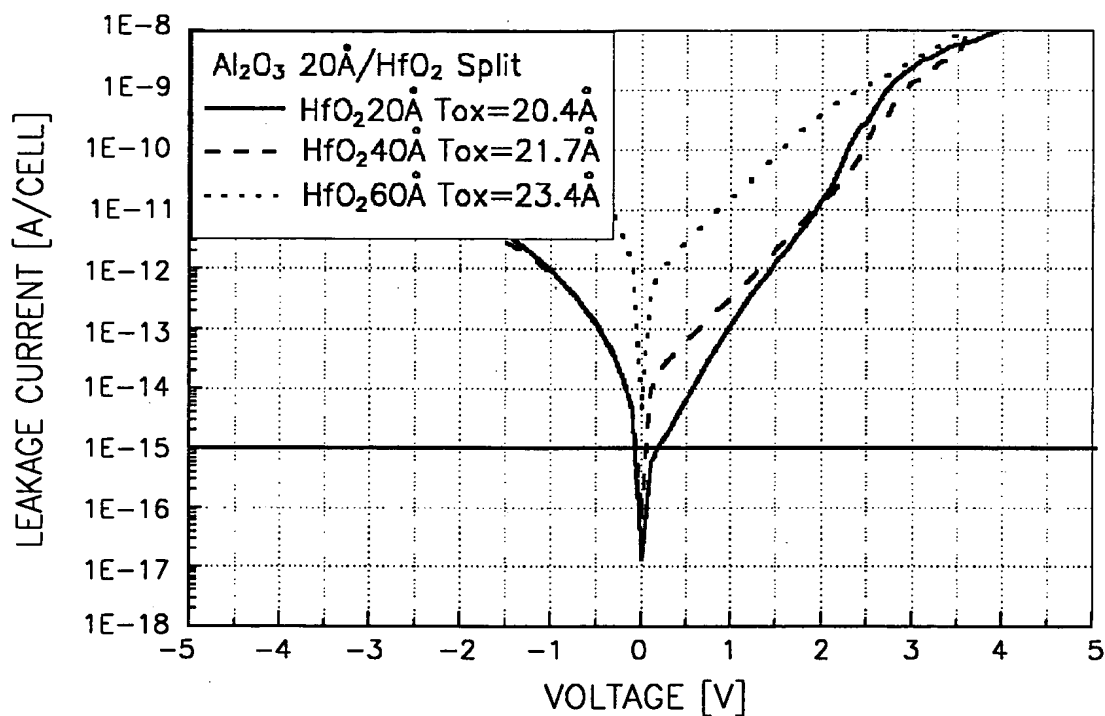
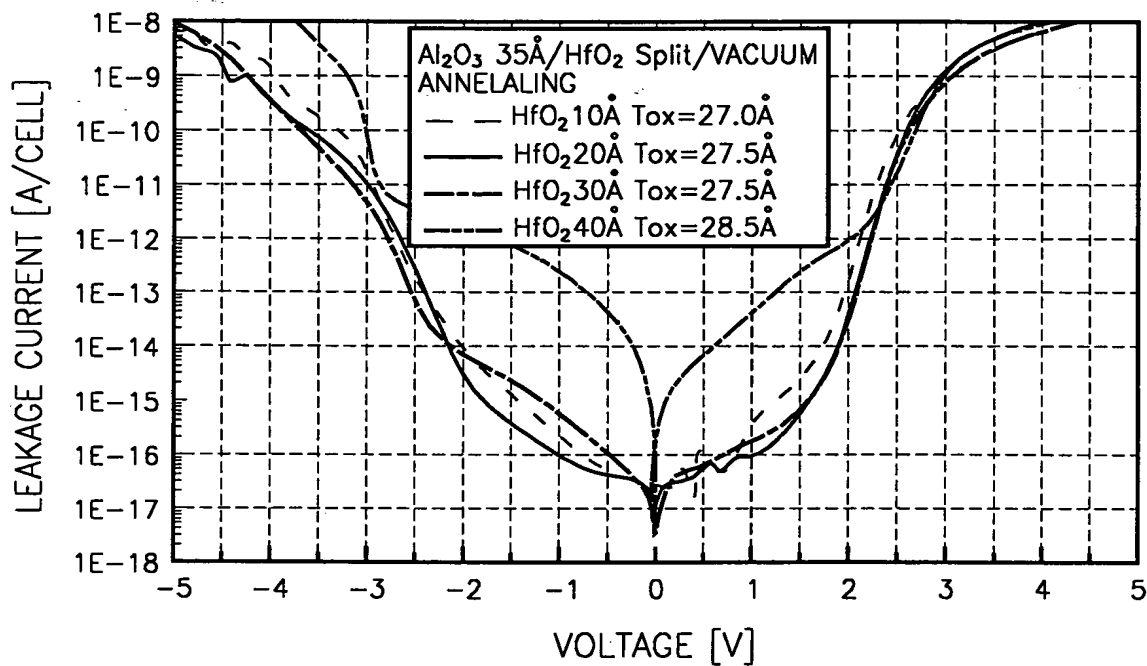


FIG. 5



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FIG. 6

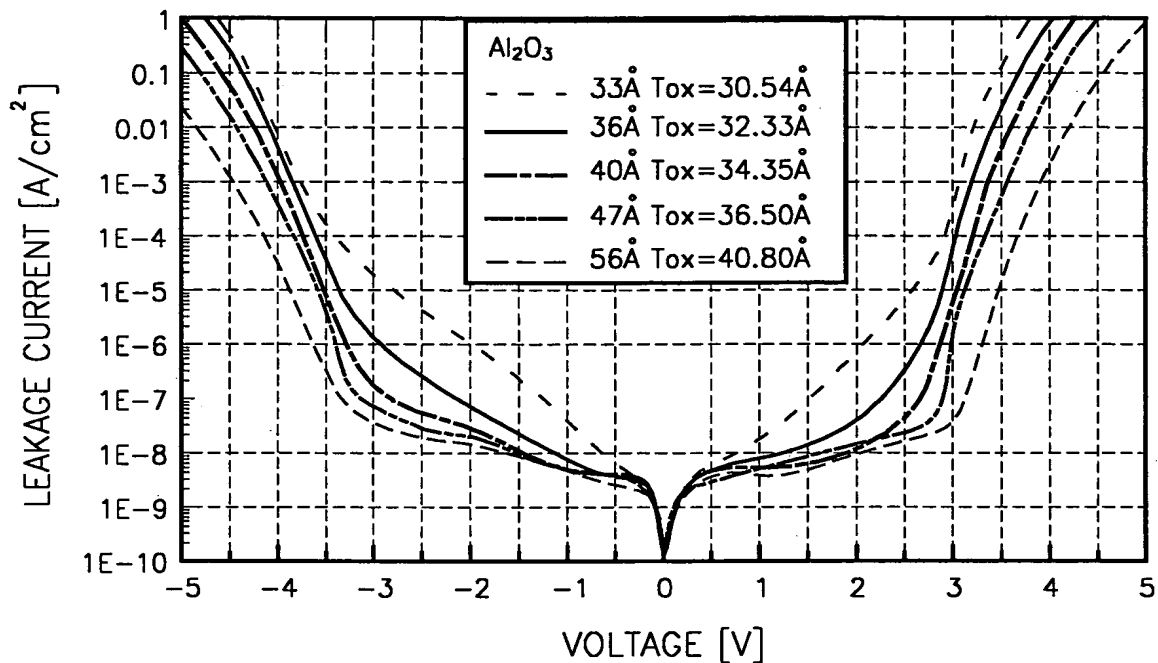
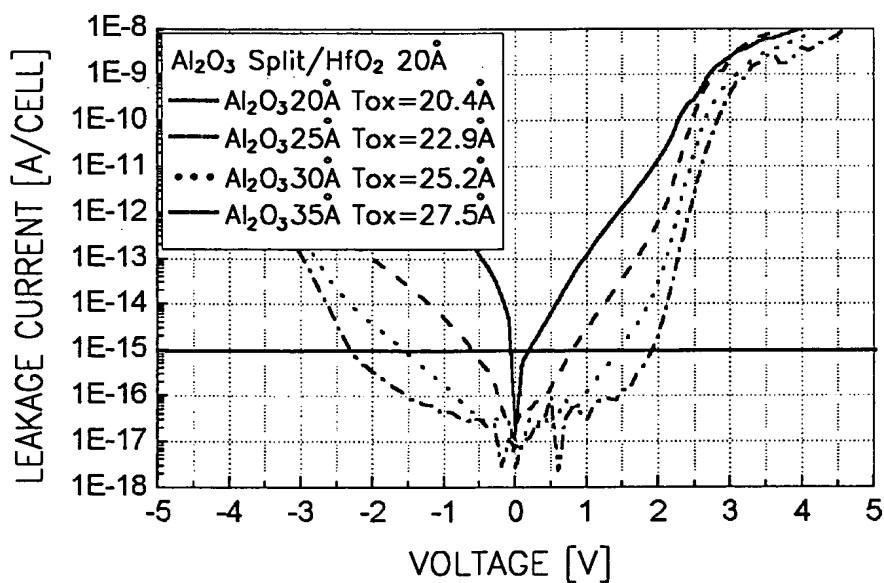


FIG. 7



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FIG. 8

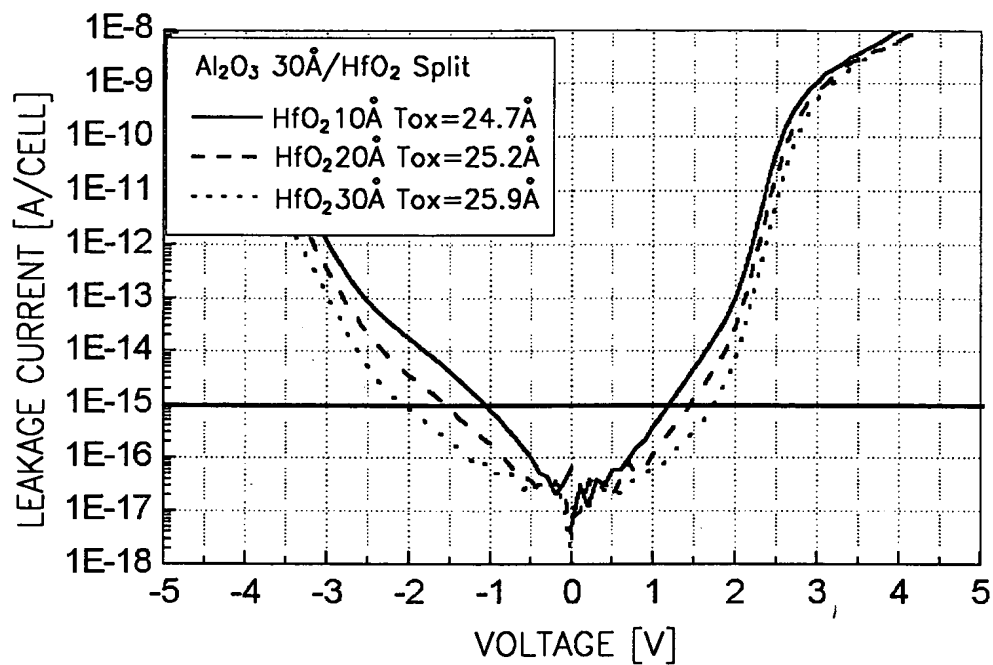
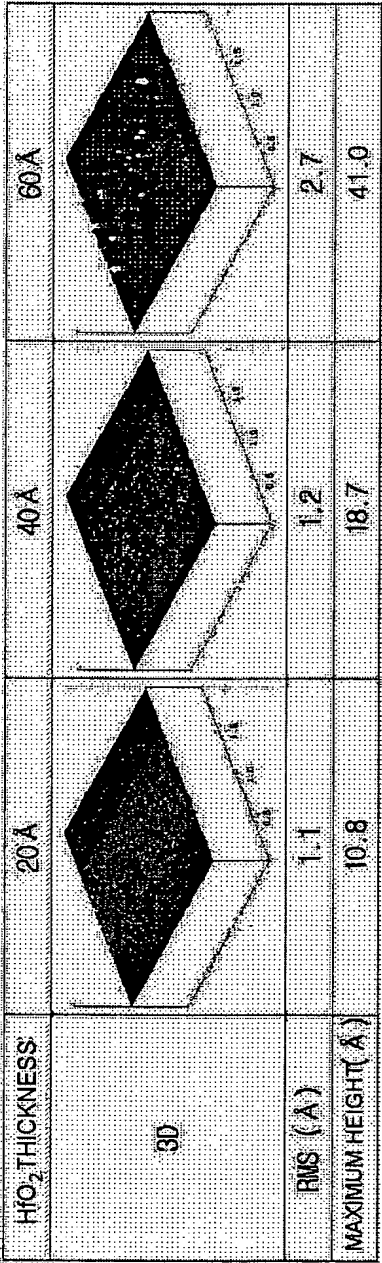


FIG. 9



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FIG. 10

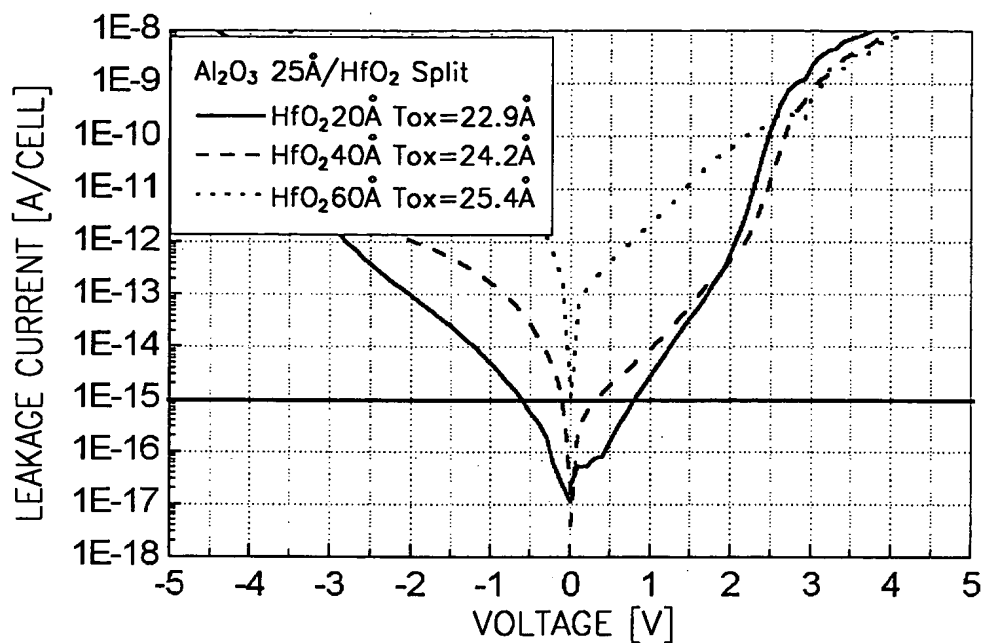
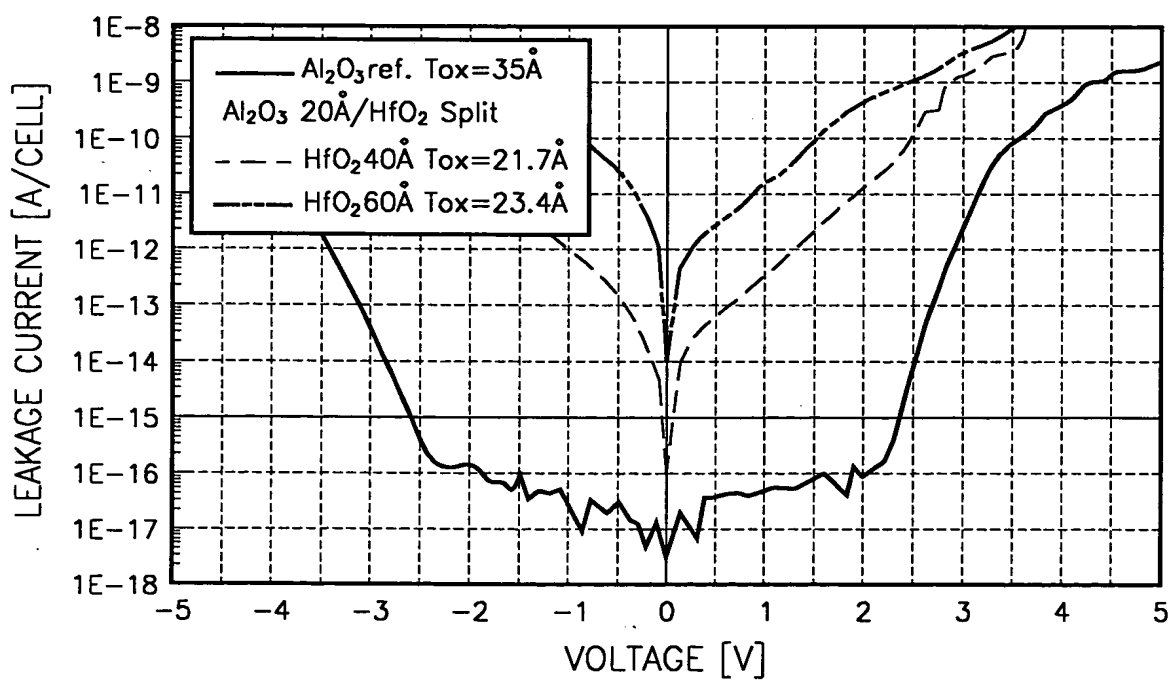


FIG. 11



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FIG. 12

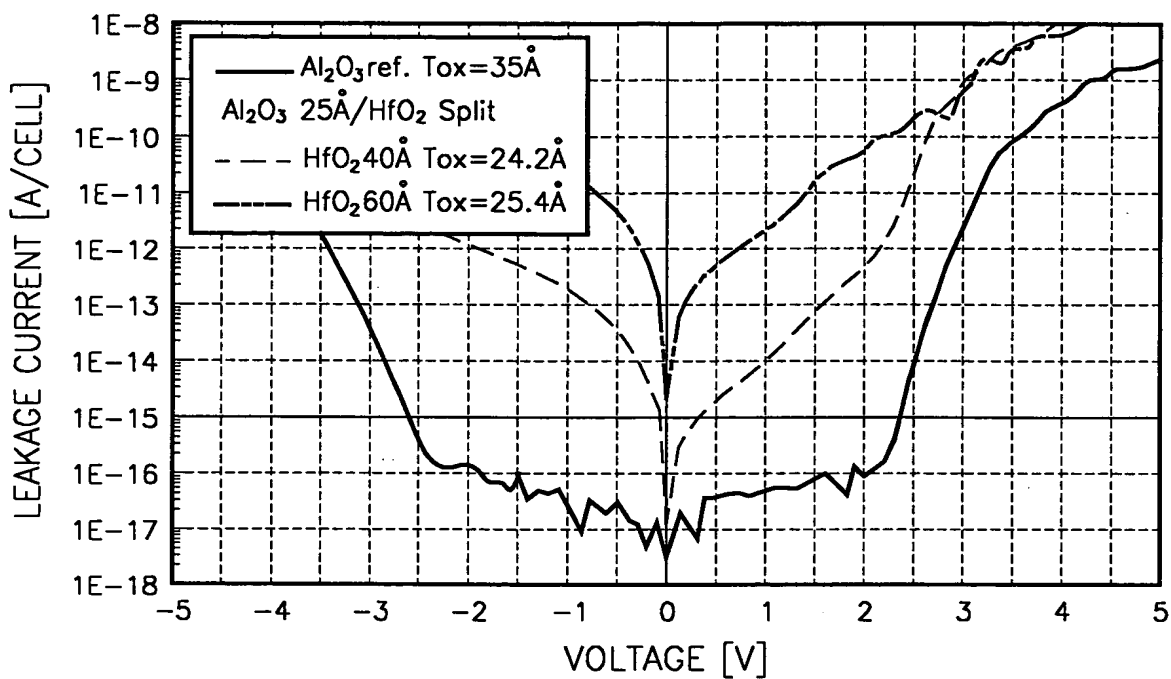
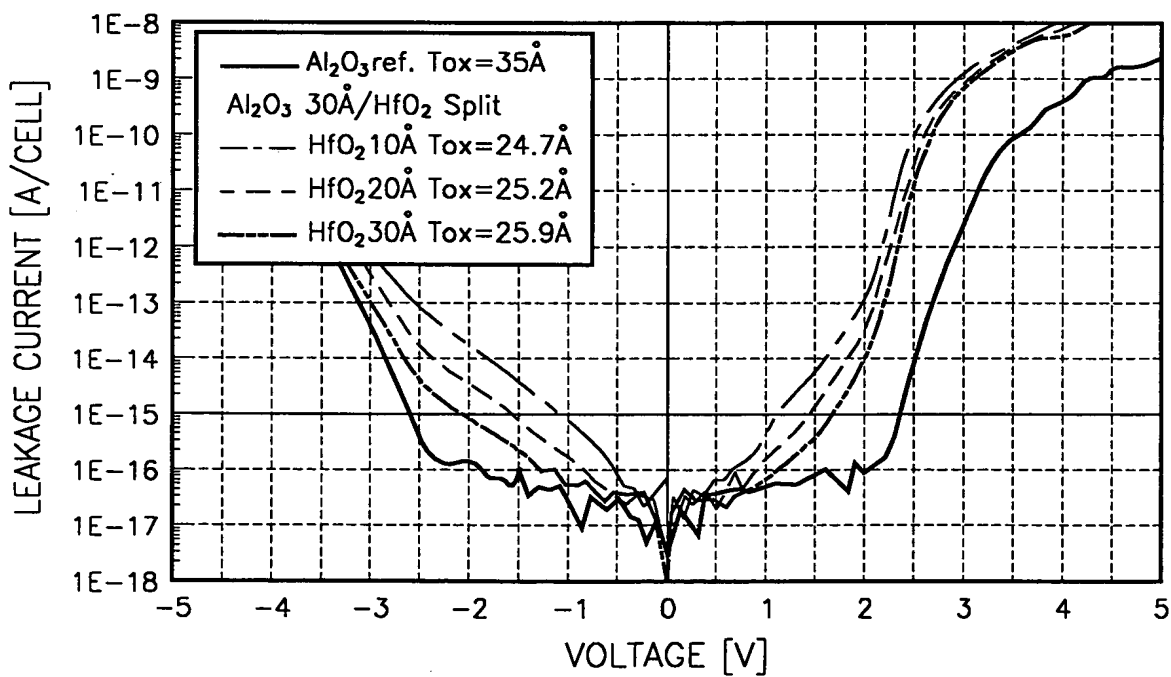


FIG. 13



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FIG. 14

